IMPACT OF BUDGET DEFICIT ON MACROECONOMICS VARIABLES: DATA FROM EUROZONE COUNTRIES (1990-2016)

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This study aims at examining the interactions between budget deficit and macroeconomic variables namely: budget deficit openness, GDP per capita growth, Gross fixed capital formation, and inflation rate. To test this analysis, we have used the generalized method of moments (GMM) system of macroeconomic data from 1990 to 2016 in six countries of the Eurozone such as France, Spain, Portugal, Greece, Ireland, and Cyprus. For this study, static and dynamic panel estimation techniques are used with the help of the OLS, GLS Fixed and Random effect for static panels, and the GMM to estimate our dynamic panel data model, which also considers the lag level of the budget deficit. The GMM panel model results indicate that openness has a significant negative impact on the budget deficit; the coefficient of gross fixed capital formation has a significant and positive impact on the budget deficit. The GDP per capita has a significant negative impact on the budget deficit and the INF has a significant and positive impact on the budget deficit.

Keywords: budget deficit, inflation, GDP Keynes, generalized method of moments, dynamic economics

Introduction

After the oil shocks of the 1970s, the early 1980s, and the debt crisis, the global recession worsened and unemployment and inflation rose together. Indeed, the debt crisis seriously threatened the international financial system: on 15 August 1982, Mexico announced that it could no longer repay its debt. It is followed by many other developing
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countries. Large banks that recklessly lent were on the verge of bankruptcy. At that time, many governments pursued the Keynesian policy to resolve the crisis (Chirac in 1975, Mauroy re-launching again in 1981, Carter in 1977-78).

The Keynesian recipe already had some success during the 1929 crisis. For Keynes, it is the State that must boost demand by helping companies in difficulty (especially social benefits). Once the recovery is complete, the deficit should disappear on its own. However, the deficits quickly become severe.

They devalue currencies, which favors exports but increases imports. In addition, they greatly accelerate mandatory fees. Finally, in a globalized economy, a revival in consumption does not necessarily benefit national companies. On the other hand, for a liberal state it is necessary to balance the budget and control inflation (money supply). To do this, the state must withdraw from economic and social life by reducing mandatory fees. After a relatively calm period in the global financial markets, the world has been facing a new economic shock since August 2007, a financial crisiisoriginating in the US real estate market (subprime crisis). The intensity and intensification of the crisis surprised many investors and financial market participants and shook their confidence.

Indeed, the issue of budget deficits is seen as one of the most debated topics among policymakers and economists in developed and developing countries.

We have tried to examine the relationship between the budget deficit and macro-economic variables such as inflation, gross fixed capital, GDP, and trade opening.

**Literature Review**

Table 1 - The budget deficit according to the economic schools

(Made by the authors)

<table>
<thead>
<tr>
<th>Economics Schools</th>
<th>Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keynesian theory</td>
<td>According to Keynes, economic crises arise due to insufficient global demand. To get the economic machine back on track, Keynes advocates the idea of increasing public spending even if it means temporarily widening deficits. Keynes succeeded in advocating a coherent economic policy: a deficit fiscal policy to create ex nihilo additional aggregate demand, combined with an expansionary monetary policy to finance this budget deficit and put downward pressure on the interest rate to increased private investment.</td>
</tr>
<tr>
<td>Neoclassical theory</td>
<td>According to neoclassical theory, the stimulus policy is less effective since when the state uses debt to finance expenditures, it refers to rising interest rates, which tends to depress private investment by an amount similar to the stimulus. The budget deficits not good for economic growth.</td>
</tr>
<tr>
<td>Ricardian Equivalence Theorem</td>
<td>No link exists between fiscal deficits and economic growth. The Ricardian theory postulates that non-compensated tax cuts imply deferral of taxes to the next generation so the current budget deficit reflects the payment of future taxes.</td>
</tr>
</tbody>
</table>
Our objective in this article is to examine the abundant literature on the impact of budget deficits on some macroeconomic variables, focusing on theoretical debates and
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econometric models, and empirical studies to draw conclusions beneficial for the macroeconomic area. Additionally, this study is among very few studies that use regression analysis in the period between (1990) and (2016) to highlight the relationship with a technique GMM panel.

Finally, this article is organized as follows. The following section describes various theories about the effects of the budget deficit on macroeconomics variables. The second section gives the results of the impact of budget deficit on macroeconomics variables using annual data for the period 1990 to 2016 using the GMM technique.

**Econometric method**

Pooled OLS; GLS; Fixed effect (FE), random effect (RE), and dynamic estimators and system GMM are used to examine the budget deficit effect on macroeconomic variable. The relation among the variables is specified as follows:

\[ \text{Budget deficit } t = f (\text{OP, GDP, GFCF, INF}) \]

\[ \text{BD}_{it} = \alpha + \alpha_1 \text{OP}_{it} + \alpha_2 \text{GDP}_{it} + \alpha_3 \text{CFGF}_{it} + \alpha_4 \text{INF}_{it} + \epsilon_{it} \]

Where the subscript \( i=1, \ldots, N \) denotes the country and \( t=1, T \) denotes the time period (the period of study is 1990-2016). BD indicates the budget deficit, OP indicates the openness rate. GDP indicates GDP per capita growth (annual %), GFCF indicates Gross fixed capital formation, INF indicates the inflation rate.

**Data**

We use annual data on budget deficit (BD), openness (OP), GDP per capita growth, gross fixed capital formation (GFCF) and inflation rate (INF). All data collected for the period 1990–2019, World Bank World Development Indicators. Our study covers 6 countries selected based on data availability, namely: France, Portugal, Cyprus, Greece, Ireland, Spain.

**Descriptive Statistics**

With a panel of 6 Eurozone countries, we begin the empirical analysis in this section with descriptive statistic of the variables. Tab.3 below summarizes statistics for the variables used for this analysis. All variables in this analysis are extracted from WDI.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD</td>
<td>162</td>
<td>1.933</td>
<td>5.358</td>
<td>-11.000</td>
<td>15.100</td>
</tr>
<tr>
<td>OP</td>
<td>162</td>
<td>82.773</td>
<td>44.390</td>
<td>35.510</td>
<td>216.670</td>
</tr>
<tr>
<td>GFCF</td>
<td>162</td>
<td>21.952</td>
<td>4.019</td>
<td>11.438</td>
<td>31.053</td>
</tr>
<tr>
<td>GDPC</td>
<td>162</td>
<td>1.960</td>
<td>3.005</td>
<td>-8.998</td>
<td>9.667</td>
</tr>
<tr>
<td>INF</td>
<td>162</td>
<td>3.088</td>
<td>3.324</td>
<td>-4.480</td>
<td>20.405</td>
</tr>
</tbody>
</table>

The correlation matrix coefficient for the variables is given in Tab.4. In fact, only the correlation coefficients between the GFCF; GDPCare statistically significant by at least 1%. Accordingly, OP and INF are insignificant linked to budget deficit.
Table 4 - GLS, POOLED OLS and Fixed-effects
(Made by the authors)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Poolde OLS</th>
<th>GLS</th>
<th>Fixed-effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>P&gt;z</td>
<td>Coef.</td>
</tr>
<tr>
<td>BD</td>
<td>0.004</td>
<td>0.685</td>
<td>0.03</td>
</tr>
<tr>
<td>OP</td>
<td>-0.452</td>
<td>0</td>
<td>-0.473</td>
</tr>
<tr>
<td>GFCCF</td>
<td>-0.509</td>
<td>0</td>
<td>-0.621</td>
</tr>
<tr>
<td>INFC</td>
<td>0.216</td>
<td>0.084</td>
<td>0.308</td>
</tr>
<tr>
<td>CONS</td>
<td>11.895</td>
<td>0</td>
<td>10.147</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.905</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The study adopts the GLS, pooled OLS, and Fixed and Random effectsto analyze the relationship between government spending and unemployment in 6 countries of the Eurozone over the period 1990-2019.

For GLS, pooled OLS, and Fixed effect are presented in Tab. 4. The results show that GDPH is not statistically significant.

The summary regression presented in Tab. 4 shows that the openness ratio has a significant positive impact on the budget deficit. A coefficient of 0.004 means that a 1% increase in openness increases the budget deficit by about 0.685. This result is consistent with that of Combes & Saadi-Sedik, 2006.

The coefficient of gross fixed capital formation of GFCF has a significant negative impact on the budget deficit. Coefficients of 0.452 mean that a 1% decrease in GFCF reduces the budget deficit by approximately 0.452. This result is consistent with (Mallik, 2013: Biza et al., 2015).

However, the GDPC ratio has a significant and negative impact on the budget deficit. Coefficients of -0.509 mean that a 1% decrease in inflation decreases the budget deficit by about 0.509.

This result is consistent with the findings of Bose et al. (2007) and Tung (2018).

However, INF has a significant and positive impact on the budget deficit. Coefficients of 0.216 mean that a 10% increase in inflation increases the budget deficit by about 0.216. This result is robust with the conclusion of Darrat (1985). In the panels FE model presented in Tab. 5, we find that all variables have a significant impact on the budget deficit in 6 countries of the Euro Zone.

However, the results show that an openness ratio of 0.061 has a positive significant impact on the budget deficit, which is also statistically significant. Coefficients of 0.061 mean that a 1% growth in openness increases the budget deficit by about 0.061.

The data obtained also indicate that the coefficient of gross fixed capital formation, equal to 0.492, negatively affects the budget deficit, which is also statistically significant.
Table 5 - Results of Sys-GMM(1990-2016)
(made by the authors)

<table>
<thead>
<tr>
<th>Dependent variable : BUDGET DEFICIT</th>
<th>Sys-GMM one -step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Coef.</td>
</tr>
<tr>
<td>BD(t-1)</td>
<td>0.853</td>
</tr>
<tr>
<td>OP</td>
<td>-0.123</td>
</tr>
<tr>
<td>GFCF</td>
<td>0.270</td>
</tr>
<tr>
<td>GDPC</td>
<td>-0.181</td>
</tr>
<tr>
<td>INF</td>
<td>0.494</td>
</tr>
<tr>
<td>Observations</td>
<td>150</td>
</tr>
<tr>
<td>No. countries</td>
<td>6</td>
</tr>
</tbody>
</table>

AR(1) in first differences: z = -1.92
Pr|z| = 0.055

AR(2) in first differences: z = 0.96
Pr|z| = 0.337

Sargantest. : chi2(5) = 2.83
Prob|chi2| = 0.725

Values in parenthesis are the estimated p values. AR (2) is tests for autocorrelation in differences. Hansen J-test refers to the over-identification test for the restrictions in GMM estimation.

* Coefficient significant at the 1 % level ** Coefficient significant at the 5 % level *** Coefficient significant at the 10 % level.

The results also show that the GDPC ratio has a significant and negative impact on the budget deficit. Coefficients of 0.632 mean that a 1% decrease in GDPC reduces the budget deficit by about 0.632. Finally, the results show that the INF ratio has a significant and positive impact on the budget deficit. Coefficients of 0.037 mean that a 1% increases in inflation increases the budget deficit by about 0.037.

The table above also shows the Houseman test that is actually used to select the model. As stated earlier, the fixed effect eliminates model in homogeneity. In relation to Houseman, the test result shows that the p value is less than (0.05); therefore a fixed effect model (FEM) is appropriate rather than a random effect model (REM).

In the FE model, the p value for the R-square is 0.905, which explains that the relationship between the dependent variable (BD) of the Eurozone countries and all independent variables (OP GFCF GDPC INF) is high in the budget deficit can be explained by GDP, OP GFCF GDPC INF. Since economic behavior is dynamic in nature, and in order to explain its evolution over time, the budget deficit model must be dynamic. In this context, we will also estimate a dynamic panel data model using both the difference and the generalized method of moments (GMM) scoring system.

In this study, we also have a dynamic panel specification in which lag levels of budget deficits are accounted for both diff and Sys-GMM estimates. The consistency of the GMM estimate depends on the validity of the instruments. We consider two specification tests to address this issue: the first is the Hansen constraint hyper-identification test, which tests the overall validity of the instruments (a score of zero means that the instruments are valid); the second is a second-order autocorrelation test for the error term, which tests for zero, according to which there is no autocorrelation.
The results of the dynamic panel evaluation are presented in Tab. 6, which shows that Hansen’s test for diff-GMM evaluation rejects the null hypothesis of constraint over-identification.

Thus, we conclude that diff-GMM scoring may not be appropriate in this context and proceed to evaluate our dynamic model using sys-GMM scoring, in which both specification tests show that the tools used are valid. Accordingly, we can conclude that the sys-GMM estimate is reliable and appropriate. According to the sys-GMM assessment presented in Tab. 5, openness has a significant negative impact on the budget deficit in the Eurozone countries. This means that a 1% decrease in openness reduces the budget deficit by about 0.122.

The coefficient of gross fixed capital formation has a significant positive impact on the budget deficit. This means that a 5% increase in gross fixed capital formation increases the budget deficit by about 0.073. This result is consistent with that of Bahmani-Oskooee (1999).

We also find that the impact on GDP per capita has a significant negative impact at the 10% level. Coefficients of 0.18 mean that a 1% decrease in GDP per capita reduces the budget deficit by about 0.18. This result is consistent with the findings of Bose et al. (2007), Tung (2018). The INF coefficient has a significant and positive impact on the budget deficit. Coefficients of 0.49 mean that a 1% increase in inflation increases the budget deficit by about 0.49. This result is robust in line with the conclusion of

Conclusion

The main purpose of this research is to investigate the impact of budget deficit rate in 6 Eurozone countries with panel data from 1990 to 2019. In order to treat the impact of budget deficit on certain macroeconomic variables we use OLS, FE, and GMM estimators. Our findings may be summarized as follows:
- empirical results for the panel model, the results of the fixed effect model show that openness has a positive effect on the budget deficit;
- the gross fixed capital formation ratio has a statistically significant negative impact on the budget deficit;
- GDPC coefficient has a significant and negative impact on the budget deficit;
- The fixed effect results show that the INF ratio has a significant and positive impact on the budget deficit. However, for dynamic panel estimates, we find that openness has a significant negative impact on the budget deficit; the gross fixed capital formation ratio has a significant and positive impact on the budget deficit. GDP per capita has a significant negative impact on the budget deficit.

References:


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